The Double-Edged Sword of Diversity: How Diversity, Conflict, and Psychological Safety Impact Software Teams

Christiaan Verwijs and Daniel Russo

***Abstract*—Team diversity can be seen as a double-edged sword. It brings additional cognitive resources to teams at the risk of increased conflict. Few studies have investigated how different types of diversity impact software teams. This study views diversity through the lens of the *categorization-elaboration model (CEM)*. We investigated how diversity in gender, age, role, and cultural background impacts team effectiveness and conflict, and how these associations are moderated by psychological safety. Our sample consisted of 1,118 participants from 161 teams and was analyzed with Covariance-Based Structural Equation Modeling (CB-SEM). We found a positive effect of age diversity on team effectiveness and gender diversity on relational conflict. Psychological safety contributed directly to effective teamwork and less conflict but did not moderate the diversity-effectiveness link. While our results are consistent with the CEM theory for age and gender diversity, other types of diversity did not yield similar results. We discuss several reasons for this, including curvilinear effects, moderators such as task interdependence, or the presence of a diversity mindset. With this paper, we argue that a dichotomous nature of diversity is oversimplified. Indeed, it is a complex relationship where context plays a pivotal role. A more nuanced understanding of diversity through the lens of theories, such as the CEM, may lead to more effective teamwork.**

***Index Terms*—Software teams, agile, diversity, psychological safety, conflict.**

I. Introduction

TEAMS are increasingly important to organizations. This is particularly relevant with the rise of Agile software methods, which 80% of organizations now predominantly employ for their software teams [1]. Agile represents a collaborative, iteration-based, and human-oriented approach to product development [29]. Many scholars have attempted to identify the factors and characteristics that influence team effectiveness [33], [99]. One factor that has gained increased attention in recent decades is team diversity [44], also in software engineering specifically [52]. *Team diversity* is generally defined as heterogeneity in member attributes, such as age, gender, cultural background, tenure, role, or personality traits [49].

While teams can be diverse on many attributes, most studies focus on demographic diversity (e.g., age, gender, cultural background) or informational diversity (e.g., professional role, education, experience). Many researchers have theorized that diversity improves team performance [43], [51], [52]. However, studies have provided mixed support. Investigations of how diversity impacts teams [44], [45], [51], [52], [53], [54] generally show that the effects are not clear-cut, vary by type of diversity, and appear to be moderated by characteristics of the task, the team, and its environment. However, diversity may also negatively impact effectiveness through an increased conflict between members [44], [45]. Several competing mechanisms and integrated models have been proposed to explain these conflicting results [55], [62], which are discussed in Section II.

Specifically for software engineering, Silveira & Prikladnicki [52] and Rodríguez-Pérez, Nadri & Nagappan [94] concluded from literature reviews that our understanding of diversity in such teams still needs to be improved. They found that most studies have only investigated gender diversity [52] and argue that a broader exploration of how diversity impacts software engineering teams can be used to create better teams and better results. A conceptual way to look at this is through the lens of *team effectiveness*. Hackman [33] defined this as the degree to which the outcomes of a team satisfy the expectations of those they work for, as well as its members. Verwijs & Russo [39] recently operationalized team effectiveness for Agile software teams through stakeholder satisfaction and team morale.

Studies have yet to explore how diversity affects software teams and their effectiveness. A more comprehensive examination is vital to understand how to design more effective teams and achieve better results. Henceforth, our research question (RQ) is:

RQ: *How does diversity in software teams impact their effectiveness?*

To answer our research question, we performed a quantitative cross-sectional study with 1,118 team members representing 161 software teams. Covariance-Based Structural Equation Modeling (CB-SEM or SEM in short) was used to test how

Manuscript received 30 January 2023; revised 15 November 2023; accepted 26 November 2023. Date of publication 8 December 2023; date of current version 9 January 2024. The work of Christiaan Verwijs was supported by The Liberators BV. Recommended for acceptance by M. Nagappan. *(Corresponding author: Daniel Russo.)*

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This article has supplementary downloadable material available at https://doi.org/10.1109/TSE.2023.3339881, provided by the authors.

Digital Object Identifier 10.1109/TSE.2023.3339881

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Article Information

Title

The Double-Edged Sword of Diversity:
How Diversity, Conflict, and Psychological Safety
Impact Software Teams

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Year

January **2024**

Published in

IEEE Transactions on Software Engineering, Vol. 50, No. 1

DOI

10.1109/TSE.2023.3339881

Key Question: *Does diversity actually make software teams more effective, or does it create more problems than it solves?*

Study Overview

Research Goal

Test how different types of diversity impact software team effectiveness and conflict, moderated by psychological safety

Study Details

— **1,118 participants** from 161 Agile teams
— CB-SEM statistical modeling
— Categorization-Elaboration Model (CEM) lens
— Age, gender, cultural, and role diversity studied

Key Question

How does diversity in software teams impact their effectiveness?

Specifically examining the dual pathways of cognitive resource expansion vs. social categorization conflict

Theoretical Background

Two Competing Mechanisms:

Cognitive Resource Theory

— More perspectives
— Broader skill sets
— Enhanced creativity

Similarity-Attraction Paradigm

— Formation of subgroups
— Communication barriers
— Increased conflict

CEM Model integrates both to explain when diversity helps vs. harms

Research Hypotheses

H1: Diversity ——> Team Effectiveness (+)

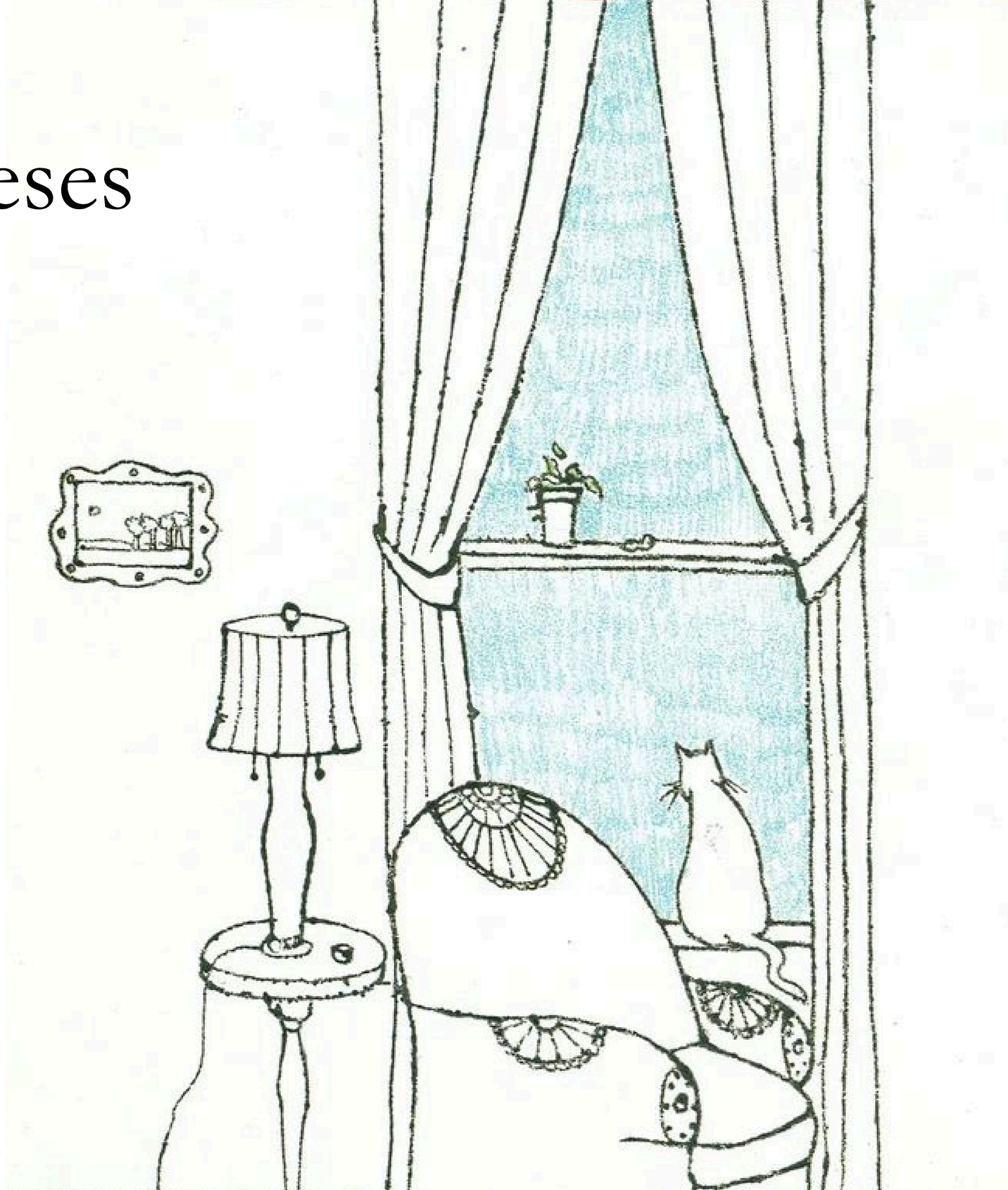
H2: Diversity ——> Relational Conflict (+)

H3: Conflict ——> Team Effectiveness (—)

H4: Psychological Safety ——> Team Effectiveness (+)

H5: Psychological Safety ——> Relational Conflict (—)

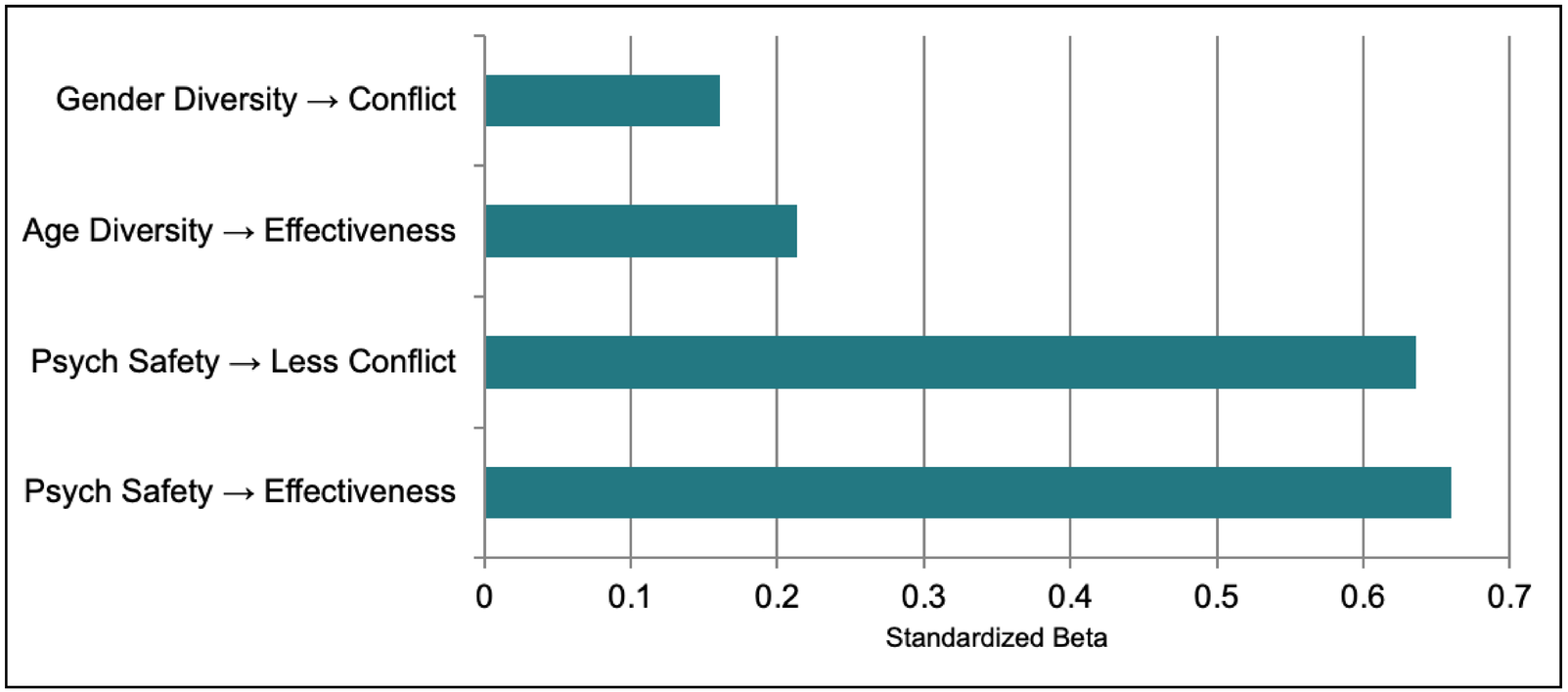
H6—H7: Psychological Safety moderates diversity effects



Sample & Methodology

Participants	**1,118 from 161 teams**
Industries	Tech (25%), Finance (18%), Healthcare (11%)
Geography	Western Europe (52%), Global participation
Team Size	5-10 members (80%)
Analysis	CB-SEM with excellent fit (CFI=.988, RMSEA=.036)

Key Findings



Age diversity improves effectiveness | Psychological safety is critical
Role diversity has no effect | PS does not moderate diversity

Strengths & Limitations

Strengths

— Large, diverse sample
— Robust CB-SEM methodology
— Strong theoretical foundation
— Validated instruments
— Practical relevance

Limitations

— Self-reported data
— Cross-sectional design
— Cultural measure too coarse
— Agile team focus
— Missing task interdependence

Implications

For Theory:

— Partial support for CEM model
— Questions "double-edged sword" metaphor
— Context matters more than composition

For Practice:

— Value age diversity for experience
— Invest in psychological safety
— Focus on team processes over demographics
— Communication skills may be key

Diversity is neither inherently good nor bad - its impact depends on context

"Who are you kidding? You're all about small government until you get stuck in a tree."

Personal Reflections

Most Compelling:

— Nuanced findings challenge simplistic diversity narratives
— Sophisticated CB-SEM methodology
— Transparency about null findings

Areas for Improvement:

— Objective performance metrics needed
— Task interdependence should be measured
— Mixed methods would provide richer insights

Future Direction:
Longitudinal study tracking team evolution with qualitative interviews

Key Takeaways

— Diversity effects are type-specific
Age helps, gender causes conflict, role/culture show no effect

— Psychological safety is paramount
Direct positive effects but does not moderate diversity

— Context matters more than composition
Team processes and skills may be more important

— Challenge Agile assumptions
Cross-functional teams are not automatically effective

"The double-edged sword of diversity may be less about the blade itself and more about how skillfully teams wield it."

Why Victorian crowds? *Same diversity dynamics, 150 years apart.*
Industrial Revolution workers navigating age, gender, and class differences faced identical psychological patterns to modern software teams—proving Verwijs & Russo's findings reflect timeless human behavior, not tech-specific challenges.

Thank You.

— Veera